

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENTFORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018**SUNDRY NOTICES AND REPORTS ON WELLS**
*Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.*5. Lease Serial No.
NMNM26394

6. If Indian, Allottee or Tribe Name

7. If Unit or CA/Agreement, Name and/or No.

8. Well Name and No.
VACA DRAW 20-17 FEDERAL 44H9. API Well No.
30-025-46117-00-X110. Field and Pool or Exploratory Area
WILDCAT;WOLFCAMP11. County or Parish, State
LEA COUNTY, NM

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well

☐ Oil Well ☒ Gas Well ☐ Other

2. Name of Operator

CIMAREX ENERGY COMPANY

Contact: TERRI STATHEM

E-Mail: tstathem@cimarex.com

3a. Address

600 N. MARIENFELD SUITE 600
MIDLAND, TX 79701

3b. Phone No. (include area code)

Ph: 432-620-1936

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)

Sec 20 T25S R33E SWSE 390FSL 2120FEL
32.109901 N Lat, 103.592613 W Lon

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	Change to Original A
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	PD

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleat in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

Cimarex Energy respectfully request approval to change the BHL for the referenced well and the target completion interval to Bone Spring.

C102 attached
Directional Plan attached

Drilling Plan attached - casing & cement design for the Bone Spring well.

TD: MD: 19751', TVD: 9850'

Carlsbad Field Office
OCD HobbsSEE ATTACHED FOR
CONDITIONS OF APPROVAL

All Previous COAs Still Apply. Except for the Following.

14. I hereby certify that the foregoing is true and correct.

Electronic Submission #471752 verified by the BLM Well Information System

For CIMAREX ENERGY COMPANY, sent to the Hobbs

Committed to AFMSS for processing by PRISCILLA PEREZ on 07/02/2019 (19PP2367SE)

Name (Printed/Typed) TERRI STATHEM

Title MANAGER REGULATORY COMPLIANCE

Signature (Electronic Submission)

Date 07/01/2019

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By JEROMY PORTER

Title PETROLEUM ENGINEER

Date 07/03/2019

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office Hobbs

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

Revisions to Operator-Submitted EC Data for Sundry Notice #471752

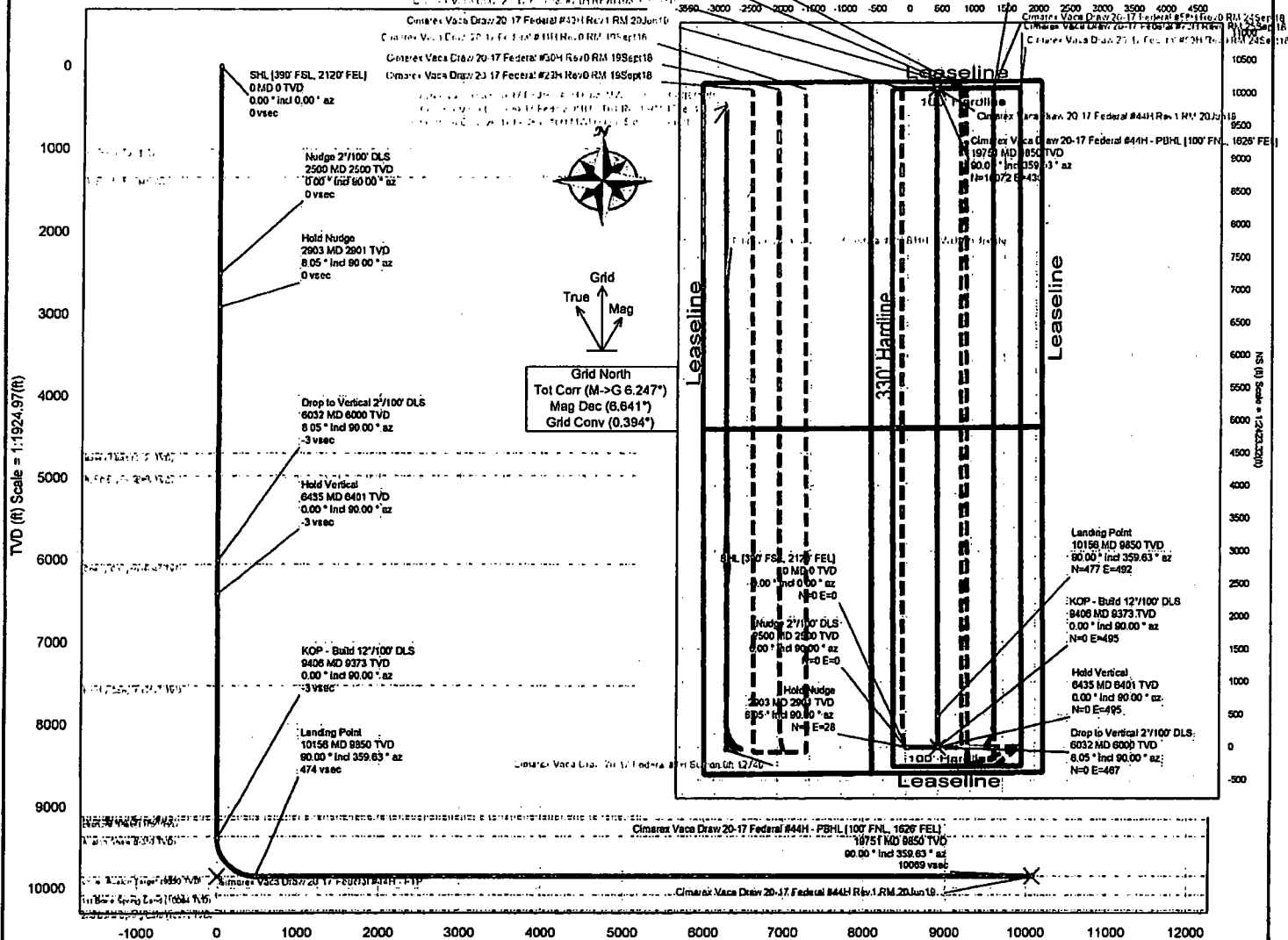
	Operator Submitted	BLM Revised (AFMSS)
Sundry Type:	APDCH NOI	APDCH NOI
Lease:	NMNM26394	NMNM26394
Agreement:		
Operator:	CIMAREX ENERGY COMPANY 600 N. MARIENFELD ST, STE 600 MIDLAND, TX 79701 Ph: 432-620-1936	CIMAREX ENERGY COMPANY 600 N. MARIENFELD SUITE 600 MIDLAND, TX 79701 Ph: 432.620.1938
Admin Contact:	TERRI STATHEM MANAGER REGULATORY COMPLIANCE E-Mail: tstathem@cimarex.com Ph: 432-620-1936	TERRI STATHEM MANAGER REGULATORY COMPLIANCE E-Mail: tstathem@cimarex.com Ph: 432-620-1936
Tech Contact:	TERRI STATHEM MANAGER REGULATORY COMPLIANCE E-Mail: tstathem@cimarex.com Ph: 432-620-1936	TERRI STATHEM MANAGER REGULATORY COMPLIANCE E-Mail: tstathem@cimarex.com Ph: 432-620-1936
Location:		
State:	NM	NM
County:	LEA	LEA
Field/Pool:	WILDCAT BONE SPRING	WILDCAT;WOLFCAMP
Well/Facility:	VACA DRAW 20-17 FEDERAL 44H Sec 20 T25S R33E Mer NMP SWSE 390FSL 2120FEL	VACA DRAW 20-17 FEDERAL 44H Sec 20 T25S R33E SWSE 390FSL 2120FEL 32.109901 N Lat, 103.592613 W Lon

Critical Point	MD	INCL	AZIM	IVD	VSEC	N(+)/S(-)	E(+)/W(-)	DLS
SHL 330' FSL, 2120' FEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rustler	1001.00	0.00	90.00	1001.00	0.00	0.00	0.00	0.00
Top of Salt	1341.00	0.00	90.00	1341.00	0.00	0.00	0.00	0.00
Nudge 2°/100' DLS	2500.00	0.00	90.00	2500.00	0.00	0.00	0.00	0.00
Hold Nudge	2902.65	8.05	90.00	2901.33	-0.16	0.00	28.25	2.00
Base of Salt	4714.19	8.05	90.00	4895.00	-1.83	0.00	282.03	0.00
Ball Canyon	4990.82	8.05	90.00	4908.00	-2.08	0.00	370.79	0.00
Drop to Vertical 2°/100' DLS	6032.19	8.05	90.00	6000.00	-3.03	0.00	466.66	0.00
Cherry Canyon	6080.61	7.08	90.00	6048.00	-3.07	0.00	473.04	2.00
Hold Vertical	6434.84	0.00	90.00	6401.33	-3.21	0.00	494.91	2.00
Brusby Canyon	7558.51	0.00	90.00	7525.00	-3.21	0.00	494.91	0.00
Bone Spring	8147.51	0.00	90.00	8114.00	-3.21	0.00	494.91	0.00
Leonard Shale	9183.51	0.00	90.00	9150.00	-3.21	0.00	494.91	0.00
Avalon Shale	9392.51	0.00	90.00	9359.00	-3.21	0.00	494.91	0.00
KOP - Build 12°/100' DLS	9408.04	0.00	90.00	9372.54	-3.21	0.00	494.91	0.00
Landing Point	10158.04	90.00	359.83	9850.00	474.25	477.45	491.81	12.00
Lower Avalon Target	10158.04	90.00	359.83	9850.00	474.25	477.45	491.81	12.00
Lower Vaca J, HW 20-17 Federal #44H - PBHL (100'	10158.04	90.00	359.83	9850.00	10068.73	10071.73	429.53	0.00
FNL 1628' FEL	19750.52			10084.00				
1st Bone Spring Sand	NaN			10272.00				
2nd Bone Spring Carb	NaN			10638.00				
2nd Bone Spring Sand	NaN			11158.00				
3rd Bone Spring Carb	NaN			11798.00				
3rd Bone Spring Sand	NaN			12269.00				
Top Wolfcamp	NaN			12294.00				
Wolfcamp X Sand	NaN			12373.00				
Wolfcamp Y Sand	NaN			12415.00				
Wolfcamp Upper A1	NaN							

Borehole:	Well:	Field:	Structure:
Vaca Draw 20-17 Federal #44H	Vaca Draw 20-17 Federal #44H	NM Lea County (NAD 83)	Cimarex Vaca Draw 20-17 Federal #44H

Gravity & Magnetic Parameters	Surface Location	Miscellaneous
Model: NDQJ 2019 Dip: 68.719° Date: 29-Jun-2019	NAD83 New Mexico State Plane, Eastern Zone, US Feet	Slit: New Slit
MagDec: 6.841° FS: 47776.226mT Gravity FS: 999.432mgals (5.0648 Based)	Lat: N 32 6 36.65 Longitude: 404507.211NUS Grid Conv: 0.3917°	TVD Rat: RXB(3432.78 above BSL)
	Long: W 103 25 53.41 Easting: 770679.881US Scale Fact: 0.9389933	Plan: Cimarex Vaca Draw 20-17 Federal #44H Rev1 R04 20Jun19

EW (R) Scale = 1:2423.32(R)



Vertical Section (ft) Azim = 359.63° Scale = 1:1924.97(ft) Origin = ON-S, OE-W

Critical Points							
Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)/S(-)	E(+)/W(-)
SHL (390° FSL, 2120° FEL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rustler	1001.00	0.00	90.00	1001.00	0.00	0.00	0.00
Top of Salt	1341.00	0.00	90.00	1341.00	0.00	0.00	0.00
Nudge 2°/100' DLS	2500.00	0.00	90.00	2500.00	0.00	0.00	0.00
Hold Nudge	2902.65	8.05	90.00	2901.33	-1.68	0.00	28.25
Base of Salt	4714.19	8.05	90.00	4693.00	-2.09	0.00	262.03
Bell Canyon	4990.92	8.05	90.00	4900.00	-3.03	0.00	320.79
Drop to Vertical 2°/100' DLS	6032.19	7.08	90.00	6048.00	-3.07	0.00	468.66
Cherry Canyon	6434.64	0.00	90.00	6401.33	-3.21	0.00	473.04
Hold Vertical	7558.51	0.00	90.00	7525.00	-3.21	0.00	494.91
Brushy Canyon	9147.51	0.00	90.00	9114.00	-3.21	0.00	494.91
Bone Spring	9183.51	0.00	90.00	9150.00	-3.21	0.00	494.91
Leonard Shale	9392.51	0.00	90.00	9359.00	-3.21	0.00	494.91
Aviation Shale	9406.04	0.00	90.00	9372.54	-3.21	0.00	494.91
KOP - Build 12°/100' DLS	9406.04	0.00	90.00	9372.54	-3.21	0.00	494.91
Landing Point	10156.04	90.00	359.63	8850.00	474.25	477.45	491.81
Lower Aviation Target	10156.04	90.00	359.63	8850.00	474.25	477.45	491.81
Cimarex Vaca Draw 20-17 Federal #44H - PBHL (100° FNL, 1620° FEL)	10750.62	90.00	359.63	8850.00	10068.73	10071.73	429.53
1st Bone Spring Sand	NaN	NaN	NaN	10084.00	NaN	NaN	NaN
2nd Bone Spring Carb	NaN	NaN	NaN	10272.00	NaN	NaN	NaN
2nd Bone Spring Sand	NaN	NaN	NaN	10638.00	NaN	NaN	NaN
3rd Bone Spring Carb	NaN	NaN	NaN	11158.00	NaN	NaN	NaN
3rd Bone Spring Sand	NaN	NaN	NaN	11798.00	NaN	NaN	NaN
Top Wolfcamp	NaN	NaN	NaN	12269.00	NaN	NaN	NaN
Wolfcamp X Sand	NaN	NaN	NaN	12294.00	NaN	NaN	NaN
Wolfcamp Y Sand	NaN	NaN	NaN	12373.00	NaN	NaN	NaN
Wolfcamp Upper A1	NaN	NaN	NaN	12415.00	NaN	NaN	NaN



Cimarex Vaca Draw 20-17 Federal #44H Rev1 RM 20Jun19 Proposal
Geodetic Report
(Def Plan)



Report Date: June 20, 2019 - 04:41 PM
Client: Cimarex Energy
Field: NM Lea County (NAD 83)
Structure / Slot: Cimarex Vaca Draw 20-17 Federal #44H / New Slot
Well: Vaca Draw 20-17 Federal #44H
Borehole: Vaca Draw 20-17 Federal #44H
UWI / AP#: Unknown / Unknown
Survey Name: Cimarex Vaca Draw 20-17 Federal #44H Rev1 RM 20Jun19
Survey Date: September 24, 2018
Tort / AHD / DDI / ERD Ratio: 106.106 ° / 10566.855 ft / 6.352 / 1.073
Coordinate Reference System: NAD83 New Mexico State Plane, Eastern Zone, US Feet
Location Lat / Long: N 32° 6' 35.65184", W 103° 35' 33.41344"
Location Grid N/E Y/X: N 404507.210 RUS, E 770679.880 RUS
CRS Grid Convergence Angle: 0.3937 °
Grid Scale Factor: 0.99996933
Version / Patch: 2.10.760.0

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 359.628 ° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: RKB
TVD Reference Elevation: 3432.700 ft above MSL
Seabed / Ground Elevation: 3406.700 ft above MSL
Magnetic Declination: 6.641 °
Total Gravity Field Strength: 998.4316mgn (9.80665 Based)
Gravity Model: GARM
Total Magnetic Field Strength: 47770.726 nT
Magnetic Dip Angle: 59.719 °
Declination Date: June 20, 2019
Magnetic Declination Model: HDGM 2019
North Reference: Grid North
Grid Convergence Used: 0.3937 °
Total Corr Mag North->Grid North: 6.2471 °
Local Coord Referenced To: Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
SHL [390° FSL, 2120° FEL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	100.00	0.00	90.00	100.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	200.00	0.00	90.00	200.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	300.00	0.00	90.00	300.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	400.00	0.00	90.00	400.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	500.00	0.00	90.00	500.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	600.00	0.00	90.00	600.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	700.00	0.00	90.00	700.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	800.00	0.00	90.00	800.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	900.00	0.00	90.00	900.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	1000.00	0.00	90.00	1000.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
Rustler	1001.00	0.00	90.00	1001.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	1100.00	0.00	90.00	1100.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	1200.00	0.00	90.00	1200.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	1300.00	0.00	90.00	1300.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
Top of Salt	1341.00	0.00	90.00	1341.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	1400.00	0.00	90.00	1400.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	1500.00	0.00	90.00	1500.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	1600.00	0.00	90.00	1600.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	1700.00	0.00	90.00	1700.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	1800.00	0.00	90.00	1800.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	1900.00	0.00	90.00	1900.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	2000.00	0.00	90.00	2000.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	2100.00	0.00	90.00	2100.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	2200.00	0.00	90.00	2200.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	2300.00	0.00	90.00	2300.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	
	2400.00	0.00	90.00	2400.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65 W 103 35 33.41	

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
Nudge 2°/100' DLS	2500.00	0.00	90.00	2500.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65	W 103 35 33.41
	2600.00	2.00	90.00	2599.98	-0.01	0.00	1.75	2.00	404507.21	770681.63	N 32 6 35.65	W 103 35 33.39
	2700.00	4.00	90.00	2699.84	-0.05	0.00	6.98	2.00	404507.21	770686.88	N 32 6 35.65	W 103 35 33.33
	2800.00	6.00	90.00	2799.45	-0.10	0.00	15.69	2.00	404507.21	770695.57	N 32 6 35.65	W 103 35 33.23
	2900.00	8.00	90.00	2898.70	-0.18	0.00	27.88	2.00	404507.21	770707.76	N 32 6 35.65	W 103 35 33.09
Hold Nudge	2902.65	8.05	90.00	2901.33	-0.18	0.00	28.25	2.00	404507.21	770708.13	N 32 6 35.65	W 103 35 33.09
	3000.00	8.05	90.00	2997.72	-0.27	0.00	41.89	0.00	404507.21	770721.77	N 32 6 35.65	W 103 35 32.93
	3100.00	8.05	90.00	3096.73	-0.36	0.00	55.80	0.00	404507.21	770735.77	N 32 6 35.65	W 103 35 32.76
	3200.00	8.05	90.00	3195.74	-0.45	0.00	69.91	0.00	404507.21	770749.78	N 32 6 35.65	W 103 35 32.60
	3300.00	8.05	90.00	3294.76	-0.54	0.00	83.91	0.00	404507.21	770763.79	N 32 6 35.65	W 103 35 32.44
	3400.00	8.05	90.00	3393.77	-0.64	0.00	97.92	0.00	404507.21	770777.80	N 32 6 35.65	W 103 35 32.27
	3500.00	8.05	90.00	3492.79	-0.73	0.00	111.83	0.00	404507.21	770791.81	N 32 6 35.64	W 103 35 32.11
	3600.00	8.05	90.00	3591.80	-0.82	0.00	125.94	0.00	404507.21	770805.82	N 32 6 35.64	W 103 35 31.95
	3700.00	8.05	90.00	3690.81	-0.91	0.00	139.95	0.00	404507.21	770819.83	N 32 6 35.64	W 103 35 31.79
	3800.00	8.05	90.00	3789.83	-1.00	0.00	153.96	0.00	404507.21	770833.83	N 32 6 35.64	W 103 35 31.62
	3900.00	8.05	90.00	3888.84	-1.09	0.00	167.97	0.00	404507.21	770847.84	N 32 6 35.64	W 103 35 31.46
	4000.00	8.05	90.00	3987.85	-1.18	0.00	181.98	0.00	404507.21	770861.85	N 32 6 35.64	W 103 35 31.30
	4100.00	8.05	90.00	4086.87	-1.27	0.00	195.99	0.00	404507.21	770875.86	N 32 6 35.64	W 103 35 31.13
	4200.00	8.05	90.00	4185.88	-1.36	0.00	209.99	0.00	404507.21	770889.87	N 32 6 35.64	W 103 35 30.97
	4300.00	8.05	90.00	4284.90	-1.45	0.00	224.00	0.00	404507.21	770903.88	N 32 6 35.64	W 103 35 30.81
	4400.00	8.05	90.00	4383.91	-1.55	0.00	238.01	0.00	404507.21	770917.88	N 32 6 35.64	W 103 35 30.65
	4500.00	8.05	90.00	4482.92	-1.64	0.00	252.02	0.00	404507.21	770931.89	N 32 6 35.63	W 103 35 30.48
	4600.00	8.05	90.00	4581.94	-1.73	0.00	266.03	0.00	404507.21	770945.90	N 32 6 35.63	W 103 35 30.32
Base of Salt	4700.00	8.05	90.00	4680.95	-1.82	0.00	280.04	0.00	404507.21	770959.91	N 32 6 35.63	W 103 35 30.16
	4714.19	8.05	90.00	4695.00	-1.83	0.00	282.03	0.00	404507.21	770961.90	N 32 6 35.63	W 103 35 30.13
	4800.00	8.05	90.00	4779.97	-1.91	0.00	294.05	0.00	404507.21	770973.92	N 32 6 35.63	W 103 35 29.99
Bell Canyon	4900.00	8.05	90.00	4878.98	-2.00	0.00	308.06	0.00	404507.21	770987.93	N 32 6 35.63	W 103 35 29.83
	4990.92	8.05	90.00	4969.00	-2.08	0.00	320.79	0.00	404507.21	771000.66	N 32 6 35.63	W 103 35 29.68
	5000.00	8.05	90.00	4977.99	-2.09	0.00	322.07	0.00	404507.21	771001.94	N 32 6 35.63	W 103 35 29.67
	5100.00	8.05	90.00	5077.01	-2.18	0.00	336.07	0.00	404507.21	771015.94	N 32 6 35.63	W 103 35 29.51
	5200.00	8.05	90.00	5176.02	-2.27	0.00	350.08	0.00	404507.21	771029.95	N 32 6 35.63	W 103 35 29.34
	5300.00	8.05	90.00	5275.04	-2.36	0.00	364.09	0.00	404507.21	771043.96	N 32 6 35.63	W 103 35 29.18
	5400.00	8.05	90.00	5374.05	-2.45	0.00	378.10	0.00	404507.21	771057.97	N 32 6 35.63	W 103 35 29.02
	5500.00	8.05	90.00	5473.08	-2.55	0.00	392.11	0.00	404507.21	771071.98	N 32 6 35.63	W 103 35 28.85
	5600.00	8.05	90.00	5572.08	-2.64	0.00	406.12	0.00	404507.21	771085.99	N 32 6 35.62	W 103 35 28.69
	5700.00	8.05	90.00	5671.09	-2.73	0.00	420.13	0.00	404507.21	771099.99	N 32 6 35.62	W 103 35 28.53
	5800.00	8.05	90.00	5770.10	-2.82	0.00	434.14	0.00	404507.21	771114.00	N 32 6 35.62	W 103 35 28.37
	5900.00	8.05	90.00	5869.12	-2.91	0.00	448.15	0.00	404507.21	771128.01	N 32 6 35.62	W 103 35 28.20
	6000.00	8.05	90.00	5968.13	-3.00	0.00	462.15	0.00	404507.21	771142.02	N 32 6 35.62	W 103 35 28.04
Drop to Vertical 2°/100' DLS	6032.19	8.05	90.00	6000.00	-3.03	0.00	466.66	0.00	404507.21	771146.53	N 32 6 35.62	W 103 35 27.99
Cherry Canyon	6080.61	7.08	90.00	6048.00	-3.07	0.00	473.04	2.00	404507.21	771152.91	N 32 6 35.62	W 103 35 27.91
	6100.00	6.70	90.00	6067.25	-3.09	0.00	475.37	2.00	404507.21	771155.23	N 32 6 35.62	W 103 35 27.89
	6200.00	4.70	90.00	6166.75	-3.15	0.00	485.29	2.00	404507.21	771165.16	N 32 6 35.62	W 103 35 27.77
	6300.00	2.70	90.00	6266.54	-3.19	0.00	491.74	2.00	404507.21	771171.60	N 32 6 35.62	W 103 35 27.70
	6400.00	0.70	90.00	6366.49	-3.21	0.00	494.70	2.00	404507.21	771174.57	N 32 6 35.62	W 103 35 27.66
Hold Vertical	6434.84	0.00	90.00	6401.33	-3.21	0.00	494.91	2.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	6500.00	0.00	90.00	6466.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	6600.00	0.00	90.00	6566.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	6700.00	0.00	90.00	6666.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	6800.00	0.00	90.00	6766.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	6900.00	0.00	90.00	6866.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	7000.00	0.00	90.00	6966.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	7100.00	0.00	90.00	7066.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	7200.00	0.00	90.00	7166.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	7300.00	0.00	90.00	7266.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	7400.00	0.00	90.00	7366.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
Brushy Canyon	7500.00	0.00	90.00	7466.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	7558.51	0.00	90.00	7525.00	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	7600.00	0.00	90.00	7586.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	7700.00	0.00	90.00	7666.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	7800.00	0.00	90.00	7766.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	7900.00	0.00	90.00	7866.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	8000.00	0.00	90.00	7966.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	8100.00	0.00	90.00	8066.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	8200.00	0.00	90.00	8166.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	8300.00	0.00	90.00	8266.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	8400.00	0.00	90.00	8366.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	8500.00	0.00	90.00	8466.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	8600.00	0.00	90.00	8566.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	8700.00	0.00	90.00	8666.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	8800.00	0.00	90.00	8766.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	8900.00	0.00	90.00	8866.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	9000.00	0.00	90.00	8966.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	9100.00	0.00	90.00	9066.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	9147.51	0.00	90.00	9114.00	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	9183.51	0.00	90.00	9150.00	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
Bone Spring Leonard Shale	9200.00	0.00	90.00	9166.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
Avalon Shale	9300.00	0.00	90.00	9266.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	9392.51	0.00	90.00	9359.00	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
KOP - Build 12"/100' DLS	9400.00	0.00	90.00	9366.49	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
	9500.00	11.27	359.63	9465.89	6.00	9.21	494.85	12.00	404516.42	771174.72	N 32 6 35.71	W 103 35 27.66
	9600.00	23.27	359.63	9561.20	35.64	38.85	494.66	12.00	404546.08	771174.53	N 32 6 36.00	W 103 35 27.66
	9700.00	35.27	359.63	9648.27	84.45	87.66	494.34	12.00	404594.87	771174.21	N 32 6 36.49	W 103 35 27.66
	9800.00	47.27	359.63	9723.29	150.30	153.51	493.92	12.00	404660.71	771173.78	N 32 6 37.14	W 103 35 27.66
	9900.00	59.27	359.63	9782.98	230.30	233.51	493.40	12.00	404740.71	771173.26	N 32 6 37.93	W 103 35 27.66
	10000.00	71.27	359.63	9824.73	320.97	324.18	492.81	12.00	404831.38	771172.67	N 32 6 38.83	W 103 35 27.66
	10100.00	83.27	359.63	9846.71	418.34	421.54	492.18	12.00	404928.74	771172.04	N 32 6 39.79	W 103 35 27.66
	10156.04	90.00	359.63	9850.00	474.25	477.45	491.81	12.00	404984.65	771171.68	N 32 6 40.34	W 103 35 27.66
	10200.00	90.00	359.63	9850.00	518.21	521.41	491.53	0.00	405028.60	771171.39	N 32 6 40.78	W 103 35 27.66
	10300.00	90.00	359.63	9850.00	618.21	621.41	490.88	0.00	405128.60	771170.74	N 32 6 41.77	W 103 35 27.66
Lower Avalon Target Landing Point	10400.00	90.00	359.63	9850.00	718.21	721.41	490.23	0.00	405228.59	771170.09	N 32 6 42.76	W 103 35 27.66
	10500.00	90.00	359.63	9850.00	818.21	821.40	489.58	0.00	405328.59	771169.45	N 32 6 43.75	W 103 35 27.66
	10600.00	90.00	359.63	9850.00	918.21	921.40	488.93	0.00	405428.58	771168.80	N 32 6 44.74	W 103 35 27.66
	10700.00	90.00	359.63	9850.00	1018.21	1021.40	488.28	0.00	405528.58	771168.15	N 32 6 45.73	W 103 35 27.66
	10800.00	90.00	359.63	9850.00	1118.21	1121.40	487.63	0.00	405628.57	771167.50	N 32 6 46.71	W 103 35 27.66
	10900.00	90.00	359.63	9850.00	1218.21	1221.39	486.98	0.00	405728.56	771166.85	N 32 6 47.70	W 103 35 27.66
	11000.00	90.00	359.63	9850.00	1318.21	1321.39	486.34	0.00	405828.56	771166.20	N 32 6 48.69	W 103 35 27.66
	11100.00	90.00	359.63	9850.00	1418.21	1421.39	485.69	0.00	405928.55	771165.55	N 32 6 49.68	W 103 35 27.66
	11200.00	90.00	359.63	9850.00	1518.21	1521.39	485.04	0.00	406028.55	771164.90	N 32 6 50.67	W 103 35 27.66
	11300.00	90.00	359.63	9850.00	1618.21	1621.39	484.39	0.00	406128.54	771164.25	N 32 6 51.66	W 103 35 27.66
	11400.00	90.00	359.63	9850.00	1718.21	1721.38	483.74	0.00	406228.54	771163.60	N 32 6 52.65	W 103 35 27.66
	11500.00	90.00	359.63	9850.00	1818.21	1821.38	483.09	0.00	406328.53	771162.95	N 32 6 53.64	W 103 35 27.66
	11600.00	90.00	359.63	9850.00	1918.21	1921.38	482.44	0.00	406428.53	771162.31	N 32 6 54.63	W 103 35 27.66
	11700.00	90.00	359.63	9850.00	2018.21	2021.38	481.79	0.00	406528.52	771161.66	N 32 6 55.62	W 103 35 27.66
	11800.00	90.00	359.63	9850.00	2118.21	2121.38	481.14	0.00	406628.52	771161.01	N 32 6 56.61	W 103 35 27.66
	11900.00	90.00	359.63	9850.00	2218.21	2221.37	480.49	0.00	406728.51	771160.36	N 32 6 57.60	W 103 35 27.66
	12000.00	90.00	359.63	9850.00	2318.21	2321.37	479.84	0.00	406828.51	771159.71	N 32 6 58.59	W 103 35 27.66
	12100.00	90.00	359.63	9850.00	2418.21	2421.37	479.20	0.00	406928.50	771159.06	N 32 6 59.58	W 103 35 27.66
	12200.00	90.00	359.63	9850.00	2518.21	2521.37	478.55	0.00	407028.49	771158.41	N 32 7 0.57	W 103 35 27.66
	12300.00	90.00	359.63	9850.00	2618.21	2621.37	477.90	0.00	407128.49	771157.76	N 32 7 1.56	W 103 35 27.66

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' '')	Longitude (E/W ° ' '')
	12400.00	90.00	359.63	9850.00	2718.21	2721.36	477.25	0.00	407228.48	771157.11	N 32 7 2.55	W 103 35 27.65
	12500.00	90.00	359.63	9850.00	2818.21	2821.36	476.80	0.00	407328.48	771156.46	N 32 7 3.54	W 103 35 27.65
	12600.00	90.00	359.63	9850.00	2918.21	2921.36	475.95	0.00	407428.47	771155.81	N 32 7 4.53	W 103 35 27.65
	12700.00	90.00	359.63	9850.00	3018.21	3021.36	475.30	0.00	407528.47	771155.17	N 32 7 5.52	W 103 35 27.65
	12800.00	90.00	359.63	9850.00	3118.21	3121.35	474.65	0.00	407628.46	771154.52	N 32 7 6.51	W 103 35 27.65
	12900.00	90.00	359.63	9850.00	3218.21	3221.35	474.00	0.00	407728.46	771153.87	N 32 7 7.50	W 103 35 27.64
	13000.00	90.00	359.63	9850.00	3318.21	3321.35	473.35	0.00	407828.45	771153.22	N 32 7 8.48	W 103 35 27.64
	13100.00	90.00	359.63	9850.00	3418.21	3421.35	472.70	0.00	407928.45	771152.57	N 32 7 8.47	W 103 35 27.64
	13200.00	90.00	359.63	9850.00	3518.21	3521.35	472.06	0.00	408028.44	771151.92	N 32 7 10.46	W 103 35 27.64
	13300.00	90.00	359.63	9850.00	3618.21	3621.34	471.41	0.00	408128.44	771151.27	N 32 7 11.45	W 103 35 27.64
	13400.00	90.00	359.63	9850.00	3718.21	3721.34	470.76	0.00	408228.43	771150.62	N 32 7 12.44	W 103 35 27.64
	13500.00	90.00	359.63	9850.00	3818.21	3821.34	470.11	0.00	408328.42	771149.97	N 32 7 13.43	W 103 35 27.64
	13600.00	90.00	359.63	9850.00	3918.21	3921.34	469.46	0.00	408428.42	771149.32	N 32 7 14.42	W 103 35 27.64
	13700.00	90.00	359.63	9850.00	4018.21	4021.34	468.81	0.00	408528.41	771148.67	N 32 7 15.41	W 103 35 27.64
	13800.00	90.00	359.63	9850.00	4118.21	4121.33	468.16	0.00	408628.41	771148.03	N 32 7 16.40	W 103 35 27.64
	13900.00	90.00	359.63	9850.00	4218.21	4221.33	467.51	0.00	408728.40	771147.38	N 32 7 17.39	W 103 35 27.64
	14000.00	90.00	359.63	9850.00	4318.21	4321.33	466.86	0.00	408828.40	771146.73	N 32 7 18.38	W 103 35 27.64
	14100.00	90.00	359.63	9850.00	4418.21	4421.33	466.21	0.00	408928.39	771146.08	N 32 7 19.37	W 103 35 27.64
	14200.00	90.00	359.63	9850.00	4518.21	4521.32	465.56	0.00	409028.39	771145.43	N 32 7 20.36	W 103 35 27.64
	14300.00	90.00	359.63	9850.00	4618.21	4621.32	464.91	0.00	409128.38	771144.78	N 32 7 21.35	W 103 35 27.64
	14400.00	90.00	359.63	9850.00	4718.21	4721.32	464.27	0.00	409228.38	771144.13	N 32 7 22.34	W 103 35 27.64
	14500.00	90.00	359.63	9850.00	4818.21	4821.32	463.62	0.00	409328.37	771143.48	N 32 7 23.33	W 103 35 27.64
	14600.00	90.00	359.63	9850.00	4918.21	4921.32	462.97	0.00	409428.37	771142.83	N 32 7 24.32	W 103 35 27.64
	14700.00	90.00	359.63	9850.00	5018.21	5021.31	462.32	0.00	409528.36	771142.18	N 32 7 25.31	W 103 35 27.64
	14800.00	90.00	359.63	9850.00	5118.21	5121.31	461.67	0.00	409628.36	771141.53	N 32 7 26.30	W 103 35 27.64
	14900.00	90.00	359.63	9850.00	5218.21	5221.31	461.02	0.00	409728.35	771140.88	N 32 7 27.29	W 103 35 27.64
	15000.00	90.00	359.63	9850.00	5318.21	5321.31	460.37	0.00	409828.34	771140.24	N 32 7 28.28	W 103 35 27.64
	15100.00	90.00	359.63	9850.00	5418.21	5421.31	459.72	0.00	409928.34	771139.59	N 32 7 29.26	W 103 35 27.63
	15200.00	90.00	359.63	9850.00	5518.21	5521.30	459.07	0.00	410028.33	771138.94	N 32 7 30.25	W 103 35 27.63
	15300.00	90.00	359.63	9850.00	5618.21	5621.30	458.42	0.00	410128.33	771138.29	N 32 7 31.24	W 103 35 27.63
	15400.00	90.00	359.63	9850.00	5718.21	5721.30	457.77	0.00	410228.32	771137.64	N 32 7 32.23	W 103 35 27.63
	15500.00	90.00	359.63	9850.00	5818.21	5821.30	457.13	0.00	410328.32	771136.99	N 32 7 33.22	W 103 35 27.63
	15600.00	90.00	359.63	9850.00	5918.21	5921.30	456.48	0.00	410428.31	771136.34	N 32 7 34.21	W 103 35 27.63
	15700.00	90.00	359.63	9850.00	6018.21	6021.29	455.83	0.00	410528.31	771135.69	N 32 7 35.20	W 103 35 27.63
	15800.00	90.00	359.63	9850.00	6118.21	6121.29	455.18	0.00	410628.30	771135.04	N 32 7 36.19	W 103 35 27.63
	15900.00	90.00	359.63	9850.00	6218.21	6221.29	454.53	0.00	410728.30	771134.39	N 32 7 37.18	W 103 35 27.63
	16000.00	90.00	359.63	9850.00	6318.21	6321.29	453.88	0.00	410828.29	771133.74	N 32 7 38.17	W 103 35 27.63
	16100.00	90.00	359.63	9850.00	6418.21	6421.28	453.23	0.00	410928.29	771133.10	N 32 7 39.16	W 103 35 27.63
	16200.00	90.00	359.63	9850.00	6518.21	6521.28	452.58	0.00	411028.28	771132.45	N 32 7 40.15	W 103 35 27.63
	16300.00	90.00	359.63	9850.00	6618.21	6621.28	451.93	0.00	411128.27	771131.80	N 32 7 41.14	W 103 35 27.63
	16400.00	90.00	359.63	9850.00	6718.21	6721.28	451.28	0.00	411228.27	771131.15	N 32 7 42.13	W 103 35 27.63
	16500.00	90.00	359.63	9850.00	6818.21	6821.28	450.63	0.00	411328.26	771130.50	N 32 7 43.12	W 103 35 27.63
	16600.00	90.00	359.63	9850.00	6918.21	6921.27	449.98	0.00	411428.26	771129.85	N 32 7 44.11	W 103 35 27.63
	16700.00	90.00	359.63	9850.00	7018.21	7021.27	449.34	0.00	411528.25	771129.20	N 32 7 45.10	W 103 35 27.63
	16800.00	90.00	359.63	9850.00	7118.21	7121.27	448.69	0.00	411628.25	771128.55	N 32 7 46.09	W 103 35 27.63
	16900.00	90.00	359.63	9850.00	7218.21	7221.27	448.04	0.00	411728.24	771127.90	N 32 7 47.08	W 103 35 27.63
	17000.00	90.00	359.63	9850.00	7318.21	7321.27	447.39	0.00	411828.24	771127.25	N 32 7 48.07	W 103 35 27.63
	17100.00	90.00	359.63	9850.00	7418.21	7421.26	446.74	0.00	411928.23	771126.60	N 32 7 49.06	W 103 35 27.63
	17200.00	90.00	359.63	9850.00	7518.21	7521.26	446.09	0.00	412028.23	771125.95	N 32 7 50.04	W 103 35 27.62
	17300.00	90.00	359.63	9850.00	7618.21	7621.26	445.44	0.00	412128.22	771125.31	N 32 7 51.03	W 103 35 27.62
	17400.00	90.00	359.63	9850.00	7718.21	7721.26	444.79	0.00	412228.22	771124.66	N 32 7 52.02	W 103 35 27.62
	17500.00	90.00	359.63	9850.00	7818.21	7821.26	444.14	0.00	412328.21	771124.01	N 32 7 53.01	W 103 35 27.62
	17600.00	90.00	359.63	9850.00	7918.21	7921.25	443.49	0.00	412428.20	771123.36	N 32 7 54.00	W 103 35 27.62
	17700.00	90.00	359.63	9850.00	8018.21	8021.25	442.84	0.00	412528.20	771122.71	N 32 7 54.99	W 103 35 27.62
	17800.00	90.00	359.63	9850.00	8118.21	8121.25	442.20	0.00	412628.19	771122.06	N 32 7 55.98	W 103 35 27.62
	17900.00	90.00	359.63	9850.00	8218.21	8221.25	441.55	0.00	412728.19	771121.41	N 32 7 56.97	W 103 35 27.62
	18000.00	90.00	359.63	9850.00	8318.21	8321.24	440.90	0.00	412828.18	771120.76	N 32 7 57.96	W 103 35 27.62
	18100.00	90.00	359.63	9850.00	8418.21	8421.24	440.25	0.00	412928.18	771120.11	N 32 7 58.95	W 103 35 27.62

Cimarex Vaca Draw 20-17 Federal #44H Rev1 RM 20Jun19 Proposal

Geodetic Report

(Def Plan)



Report Date: June 20, 2019 - 04:42 PM
Client: Cimarex Energy
Field: NM Lea County (NAD 83)
Structure / Slot: Cimarex Vaca Draw 20-17 Federal #44H / New Slot
Well: Vaca Draw 20-17 Federal #44H
Borehole: Vaca Draw 20-17 Federal #44H
UWI / API#: Unknown / Unknown
Survey Name: Cimarex Vaca Draw 20-17 Federal #44H Rev1 RM 20Jun19
Survey Date: September 24, 2018
Tort / AHD / DDI / ERD Ratio: 106.108 ° / 10568.855 ft / 6.352 / 1.073
Coordinate Reference System: NAD83 New Mexico State Plane, Eastern Zone, US Feet
Location Lat / Long: N 32° 6' 35.85184", W 103° 35' 33.41344"
Location Grid N/E Y/X: N 404507.210 RUS, E 770679.880 RUS
CRS Grid Convergence Angle: 0.3937 °
Grid Scale Factor: 0.99996933
Version / Patch: 2.10.760.0

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 359.628 ° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: RKB
TVD Reference Elevation: 3432.700 ft above MSL
Seabed / Ground Elevation: 3406.700 ft above MSL
Magnetic Declination: 6.641 °
Total Gravity Field Strength: 998.4318mgn (9.80665 Based)
Gravity Model: GARM
Total Magnetic Field Strength: 47770.728 nT
Magnetic Dip Angle: 59.719 °
Declination Date: June 20, 2019
Magnetic Declination Model: HDGM 2019
North Reference: Grid North
Grid Convergence Used: 0.3937 °
Total Corr Mag North->Grid North: 6.2471 °
Local Coord Referenced To: Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' '')	Longitude (E/W ° ' '')
SHL [390' FSL, 2120' FEL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	404507.21	770679.88	N 32 6 35.65	W 103 35 33.41
Nudge 2"/100'	2500.00	0.00	90.00	2500.00	0.00	0.00	0.00	0.00	404507.21	770679.88	N 32 6 35.65	W 103 35 33.41
DLS	2902.65	8.05	90.00	2901.33	-0.18	0.00	28.25	2.00	404507.21	770708.13	N 32 6 35.65	W 103 35 33.09
Hold Nudge	6032.19	8.05	90.00	6000.00	-3.03	0.00	466.66	0.00	404507.21	771146.53	N 32 6 35.62	W 103 35 27.99
Drop to Vertical	6434.84	0.00	90.00	6401.33	-3.21	0.00	494.91	2.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
2"/100' DLS	9406.04	0.00	90.00	9372.54	-3.21	0.00	494.91	0.00	404507.21	771174.78	N 32 6 35.62	W 103 35 27.66
Hold Vertical	10156.04	90.00	359.63	9850.00	474.25	477.45	491.81	12.00	404984.65	771171.68	N 32 6 40.34	W 103 35 27.66
KOP - Build												
12"/100' DLS												
Landing Point												
Cimarex Vaca Draw 20-17 Federal #44H - PBHL [100' FNL, 1626' FEL]	19750.52	90.00	359.63	9850.00	10068.73	10071.73	429.53	0.00	414578.61	771109.40	N 32 8 15.28	W 103 35 27.61

Survey Type: Def Plan

Survey Error Model: ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma
Survey Program:

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
Description	Part	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Expected Max Inclination (deg)	Survey Tool Type	Borehole / Survey			
	1	0.000	26.000	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS-Depth Only	Vaca Draw 20-17 Federal #44H / Cimarex Vaca Draw 20-17 Federal #44H Rev1 RM 20Jun19			
	1	26.000	19750.521	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS	Vaca Draw 20-17 Federal #44H / Cimarex Vaca Draw 20-17			

Cimarex Vaca Draw 20-17 Federal #44H Rev1 RM 20Jun19 Anti-Collision Summary Report

Analysis Date-24hr Time: June 20, 2019 - 16:42
 Client: Cimarex Energy
 Field: NM Lea County (NAD 83)
 Structure: Cimarex Vaca Draw 20-17 Federal #44H
 Slot: New Slot
 Well: Vaca Draw 20-17 Federal #44H
 Borehole: Vaca Draw 20-17 Federal #44H
 Scan MD Range: 0.00ft ~ 19750.52ft

Analysis Method: 3D Least Distance
 Reference Trajectory: Cimarex Vaca Draw 20-17 Federal #44H Rev1 RM 20Jun19 (Def Plan)
 Depth Interval: Every 10.00 Measured Depth (ft)
 Rule Set: NAL Procedure: D&M AntiCollision Standard S002
 Min Pts: All local minima indicated.
 Version / Patch: 2.10.760.0
 Database \ Project: US1153APP452.dir.sib.com\drilling-NM Lea County 2.10

Trajectory Error Model: ISCWSA0 3-D 95.000% Confidence 2.7955 sigma, for subject well. For offset wells, error model version is specified with each well respectively.

Offset Trajectories Summary

Offset Selection Criteria

Wellhead distance scan:
 Selection filters:

Not performed!
 Definitive Surveys - Definitive Plans - Definitive surveys exclude definitive plans
 - All Non-Def Surveys when no Def-Survey is set in a borehole - All Non-Def Plans when no Def-Plan is set in a borehole

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		

Results highlighted: Sep-Factor separation <= 1.50 ft

Cimarex Vaca Draw 20-17
 Federal #43H Rev1 RM
 20Jun19 (Def Plan)

19.99	16.49	17.49	3.50	N/A	MAS = 5.03 (m)	0.00	0.00	CtCt<=15m<15.00				Enter Alert	Fail Minor
19.99	16.49	17.49	3.50	6560.22	MAS = 5.03 (m)	28.00	28.00					WRP	
19.99	20.01	5.82	-0.02	1.50	OSF1.50	1920.00	1920.00		OSF<1.50			Enter Minor	
19.99	25.48	2.17	-5.49	1.14	OSF1.50	2500.00	2500.00					MinPt-CtCt	
20.01	25.55	2.14	-5.54	1.14	OSF1.50	2510.00	2510.00					MINPT-O-EOU	
20.06	25.62	2.15	-5.56	1.14	OSF1.50	2520.00	2520.00					MinPts	
25.29	26.64	7.70	-0.35	1.48	OSF1.50	2690.00	2689.86		OSF>1.50			Exit Minor	
92.70	29.70	72.08	63.00	4.97	OSF1.50	3220.00	3215.55		OSF>5.00			Exit Alert	
514.94	73.41	465.17	441.53	10.84	OSF1.50	8890.00	8856.49					MINPT-O-EOU	
514.99	73.48	465.17	441.51	10.83	OSF1.50	8900.00	8866.49					MinPt-O-ADP	
517.82	74.29	467.46	443.54	10.77	OSF1.50	9020.00	8986.49					MinPt-O-SF	
760.28	60.02	719.43	700.28	19.76	OSF1.50	10170.00	9850.00					MinPt-CtCt	
760.28	230.00	608.11	530.28	5.00	OSF1.50	16640.00	9850.00		OSF<5.00			Enter Alert	
760.28	326.20	541.98	434.08	3.51	OSF1.50	19750.52	9850.00					MinPts	

Cimarex Vaca Draw 20-17
 Federal #45H Rev1 RM
 20Jun19 (Def Plan)

20.00	18.50	17.50	3.50	N/A	MAS = 5.03 (m)	0.00	0.00	CtCt<=15m<15.00				Enter Alert	Fail Minor
20.00	18.50	17.50	3.50	N/A	MAS = 5.03 (m)	26.00	26.00					WRP	
20.00	20.00	5.83	0.00	1.50	OSF1.50	1920.00	1920.00		OSF<1.50			Enter Minor	
20.00	20.76	5.33	-0.76	1.44	OSF1.50	2000.00	2000.00					MinPt-CtCt	
20.02	20.83	5.30	-0.81	1.43	OSF1.50	2010.00	2010.00					MINPT-O-EOU	
20.07	20.90	5.30	-0.83	1.43	OSF1.50	2020.00	2020.00					MinPts	

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
21.11	21.32	6.06	-0.21	1.48		OSF1.50	2080.00	2080.00		OSF>1.50		Exit Minor	
72.39	23.74	55.73	48.65	4.94		OSF1.50	2570.00	2569.99	OSF>5.00			Exit Alert	
127.18	39.92	99.73	87.26	5.00		OSF1.50	5300.00	5275.04	OSF<5.00			Enter Alert	
136.81	46.45	105.02	90.37	4.58		OSF1.50	6040.00	6007.74				MinPt-O-SF	
150.63	47.16	118.36	103.47	4.98		OSF1.50	6280.00	6248.57	OSF>5.00			Exit Alert	
375.95	61.06	334.41	314.89	9.57		OSF1.50	8940.00	8906.49				MinPt-CtCi	
376.05	61.45	334.25	314.60	9.50		OSF1.50	9000.00	8966.49				MINPT-O-EQU	
376.11	61.53	334.26	314.59	9.49		OSF1.50	9010.00	8976.49				MinPt-O-ADP	
378.97	62.42	336.53	318.56	9.43		OSF1.50	9120.00	9086.49				MinPt-O-SF	
633.59	191.80	504.82	441.69	5.00		OSF1.50	15030.00	9850.00	OSF<5.00			Enter Alert	
633.59	338.24	407.26	295.35	2.82		OSF1.50	19750.52	9850.00				MinPts	

Cimarex Vaca Draw 20-17
Federal #57H Rev0 RM
24Sept18 (Non-Def Plan)

1199.86	32.81	1197.36	1167.05	N/A	MAS = 10.00 (m)	0.00	0.00					Warning Alert	
1199.84	32.81	1197.34	1167.03	N/A	MAS = 10.00 (m)	26.00	26.00					Surface	
455.93	65.68	411.04	390.26	10.89	OSF1.50	9480.00	9428.38					WRP	
456.09	66.22	410.83	389.87	10.80	OSF1.50	9530.00	9495.10					MinPt-CtCi	
456.22	66.37	410.86	389.84	10.78	OSF1.50	9550.00	9514.32					MINPT-O-EQU	
468.38	142.22	370.48	324.18	5.00	OSF1.50	13230.00	9850.00	OSF<5.00				MinPt-O-ADP	
468.39	344.01	235.96	122.38	2.04	OSF1.50	19750.52	9850.00					Enter Alert	
												MinPts	

Cimarex Vaca Draw 20-17
Federal #58H Rev0 RM
24Sept18 (Non-Def Plan)

1219.91	32.81	1217.41	1187.10	N/A	MAS = 10.00 (m)	0.00	0.00					Warning Alert	
1219.89	32.81	1217.39	1187.08	N/A	MAS = 10.00 (m)	26.00	26.00					Surface	
724.98	78.70	671.49	648.28	14.32	OSF1.50	9440.00	9406.46					WRP	
725.03	79.01	671.32	648.01	14.26	OSF1.50	9480.00	9446.20					MinPt-CtCi	
726.24	79.26	672.38	648.98	14.24	OSF1.50	9530.00	9495.10					MinPts	
876.42	83.45	619.89	792.97	16.23	OSF1.50	10140.00	9849.73					MinPt-O-SF	
881.33	266.31	702.88	615.02	5.00	OSF1.50	17110.00	9850.00	OSF<5.00				MinPt-O-SF	
881.33	349.08	647.70	532.26	3.81	OSF1.50	19750.52	9850.00					Enter Alert	
												MinPts	

Cimarex Vaca Draw 20-17
Federal #71H Rev0 RM
25Sept18 (Non-Def Plan)

1749.79	32.81	1747.29	1716.99	N/A	MAS = 10.00 (m)	0.00	0.00					Pass	
1749.76	32.81	1747.26	1716.95	N/A	MAS = 10.00 (m)	10.00	10.00					Surface	
1749.78	32.81	1747.26	1716.95	N/A	MAS = 10.00 (m)	26.00	26.00					MinPts	
538.55	64.91	494.02	473.64	13.12	OSF1.50	9406.04	9372.54					WRP	
538.56	64.93	494.02	473.63	13.12	OSF1.50	9410.00	9378.48					MinPt-CtCi	
539.19	65.04	494.58	474.15	13.10	OSF1.50	9440.00	9406.46					MinPts	
2630.71	320.81	2416.01	2309.91	12.39	OSF1.50	19750.52	9850.00					MinPt-O-SF	
												MinPts	

Cimarex Vaca Draw 20-17
Federal #72H Rev0 25Sept18
(Non-Def Plan)

1769.80	32.81	1767.30	1736.99	N/A	MAS = 10.00 (m)	0.00	0.00					Pass	
1769.78	32.81	1767.26	1736.95	N/A	MAS = 10.00 (m)	10.00	10.00					Surface	
1769.76	32.81	1767.26	1736.95	N/A	MAS = 10.00 (m)	26.00	26.00					MinPts	
1768.79	32.81	1753.87	1735.98	142.17	MAS = 10.00 (m)	2070.00	2070.00					WRP	
922.17	55.16	864.28	867.01	28.64	OSF1.50	9406.04	9372.54					MinPt-O-SF	
922.17	55.18	864.25	867.00	28.63	OSF1.50	9410.00	9376.49					MinPt-CtCi	
929.13	55.92	890.72	873.21	28.43	OSF1.50	9550.00	9514.32					MinPts	
2735.42	320.00	2521.25	2415.42	12.81	OSF1.50	19750.52	9850.00					MinPt-O-SF	
												MinPts	

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		

Cimarex Vaca Draw 20-17
Federal #59H Rev0 RM
24Sept18 (Non-Def Plan)

Pass													
1239.91	32.81	1237.41	1207.11	N/A	MAS = 10.00 (m)	0.00	0.00					Surface	
1239.89	32.81	1237.39	1207.08	N/A	MAS = 10.00 (m)	26.00	26.00					WRP	
1239.89	32.81	1225.24	1207.08	101.87	MAS = 10.00 (m)	2000.00	2000.00					MinPts	
1239.95	32.81	1225.15	1207.14	100.88	MAS = 10.00 (m)	2030.00	2030.00					MINPT-O-EOU	
1278.26	32.81	1261.56	1245.45	89.85	MAS = 10.00 (m)	2600.00	2599.98					MinPt-O-SF	
1188.47	45.48	1155.28	1140.89	41.40	OSF1.50	6120.00	6087.12					MinPts	
1186.48	45.48	1155.29	1140.98	41.38	OSF1.50	6130.00	6097.07					MinPt-O-ADP	
1188.94	45.66	1157.64	1143.28	41.31	OSF1.50	6240.00	6206.64					MinPt-O-SF	
1289.03	51.56	1253.82	1237.46	39.33	OSF1.50	7220.00	7186.49					MinPt-O-SF	
1295.09	64.09	1251.53	1231.00	31.48	OSF1.50	9580.00	9542.67					MINPT-O-EOU	
1295.47	64.54	1251.81	1230.93	31.26	OSF1.50	9650.00	9606.01					MinPt-O-ADP	
1298.56	68.51	1252.05	1230.05	29.45	OSF1.50	10158.04	9850.00					MinPt-CtCt	
1299.53	341.51	1071.02	958.02	5.74	OSF1.50	19750.52	9850.00					MinPts	

Cimarex Vaca Draw 20-17
Federal #73H Rev0 RM
25Sept18 (Non-Def Plan)

Pass													
1789.80	32.81	1787.30	1756.99	N/A	MAS = 10.00 (m)	0.00	0.00					Surface	
1789.78	32.81	1787.26	1756.95	N/A	MAS = 10.00 (m)	10.00	10.00					MinPts	
1789.78	32.81	1787.26	1756.95	N/A	MAS = 10.00 (m)	26.00	26.00					WRP	
1789.76	32.81	1775.06	1756.95	146.50	MAS = 10.00 (m)	2010.00	2010.00					MinPts	
1789.81	32.81	1774.72	1757.00	142.02	MAS = 10.00 (m)	2260.00	2260.00					MINPT-O-EOU	
1790.12	32.81	1774.79	1757.31	139.37	MAS = 10.00 (m)	2500.00	2500.00					MinPt-O-SF	
1763.07	32.81	1748.23	1730.26	142.92	MAS = 10.00 (m)	2902.65	2901.33					MinPt-O-SF	
1345.78	33.84	1322.35	1312.13	65.69	OSF1.50	6100.00	6067.25					MinPt-O-SF	
1326.67	32.81	1304.18	1293.86	67.97	MAS = 10.00 (m)	8430.00	8398.49					MINPT-O-EOU	
1326.67	51.02	1291.65	1275.65	41.38	OSF1.50	9408.04	9372.54					MinPt-CtCt	
1326.71	51.13	1291.82	1275.58	41.27	OSF1.50	9420.00	9388.49					MinPts	
1357.47	53.51	1320.83	1303.96	40.14	OSF1.50	9750.00	9687.50					MinPt-O-SF	
2897.24	318.37	2684.16	2578.87	13.75	OSF1.50	19750.52	9850.00					MinPts	

Cimarex Vaca Draw 20-17
Federal #31H Rev0 RM
19Sept18 (Non-Def Plan)

Pass													
1878.89	32.81	1876.39	1848.08	N/A	MAS = 10.00 (m)	0.00	0.00					Surface	
1878.89	32.81	1876.36	1848.08	60323.08	MAS = 10.00 (m)	26.00	26.00					WRP	
1821.38	32.81	1804.11	1788.57	123.41	MAS = 10.00 (m)	2770.00	2769.60					MinPts	
1821.38	32.81	1804.10	1788.57	123.28	MAS = 10.00 (m)	2780.00	2779.55					MINPT-O-EOU	
1945.98	41.00	1917.81	1904.98	75.73	OSF1.50	5520.00	5492.87					MinPt-O-SF	
2019.01	43.29	1989.31	1975.72	74.15	OSF1.50	6100.00	6067.25					MinPt-O-SF	
2039.12	346.52	1807.27	1692.60	8.88	OSF1.50	19750.52	9850.00					MinPts	

Cimarex Vaca Draw 20-17
Federal #30H Rev0 RM
19Sept18 (Non-Def Plan)

Pass													
1898.86	32.81	1896.36	1866.06	N/A	MAS = 10.00 (m)	0.00	0.00					Surface	
1898.86	32.81	1896.33	1866.06	59271.80	MAS = 10.00 (m)	26.00	26.00					WRP	
1898.86	32.81	1881.00	1866.06	123.48	MAS = 10.00 (m)	2500.00	2500.00					MinPts	
1898.88	32.81	1880.97	1866.07	123.08	MAS = 10.00 (m)	2510.00	2510.00					MINPT-O-EOU	
2393.64	78.56	2340.43	2315.08	47.15	OSF1.50	9480.00	9448.20					MinPts	
2453.80	85.37	2396.06	2368.44	44.37	OSF1.50	10156.04	9850.00					MinPt-CtCt	
2453.81	352.32	2218.10	2101.49	10.51	OSF1.50	19750.52	9850.00					MinPts	

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
Cimarex Vaca Draw 20-17 Federal #29H Rev0 RM 19Sept18 (Non-Def Plan)													
	1918.87	32.81	1916.37	1886.07	N/A	MAS = 10.00 (m)	0.00	0.00					Pass
	1918.87	32.81	1916.34	1886.07	61608.59	MAS = 10.00 (m)	26.00	26.00					Surface
	1918.87	32.81	1904.28	1886.07	158.50	MAS = 10.00 (m)	1980.00	1980.00					WRP
	1918.93	32.81	1904.21	1886.13	156.74	MAS = 10.00 (m)	2010.00	2010.00					MinPts
	1958.11	32.81	1941.42	1925.30	137.80	MAS = 10.00 (m)	2600.00	2599.98					MINPT-O-EOU
	2014.81	32.81	1997.77	1982.01	138.39	MAS = 10.00 (m)	2902.65	2901.33					MinPt-O-SF
	2778.36	44.30	2747.89	2734.06	99.61	OSF1.50	6100.00	6067.25					MinPt-O-SF
	2868.24	47.31	2835.88	2820.93	95.92	OSF1.50	6800.00	6766.49					MinPt-O-SF
	2869.59	344.72	2638.94	2524.87	12.57	OSF1.50	19750.52	9850.00					MinPts

Cimarex Vaca Draw 20-17 Federal #6H MWD Final(Surten Corrected) (Def Survey)													
	2538.57	32.81	2538.07	2505.77	N/A	MAS = 10.00 (m)	0.00	0.00					Pass
	2538.53	32.81	2535.97	2505.72	45700.72	MAS = 10.00 (m)	26.00	26.00					Surface
	2535.23	32.81	2529.76	2502.43	850.83	MAS = 10.00 (m)	700.00	700.00					WRP
	2535.84	32.81	2528.47	2503.03	654.32	MAS = 10.00 (m)	910.00	910.00					MinPts
	2538.26	32.81	2530.06	2505.46	444.23	MAS = 10.00 (m)	1320.00	1320.00					MINPT-O-EOU
	2519.48	32.81	2505.44	2488.87	218.38	MAS = 10.00 (m)	2580.00	2579.99					MINPT-O-EOU
	2519.57	32.81	2505.51	2486.76	217.83	MAS = 10.00 (m)	2600.00	2599.98					MinPts
	2542.46	32.81	2528.43	2509.66	220.18	MAS = 10.00 (m)	2902.65	2901.33					MinPt-O-SF
	2603.13	32.81	2588.48	2570.32	213.94	MAS = 10.00 (m)	3310.00	3304.66					MinPt-O-SF
	3023.88	32.81	3001.31	2991.07	150.55	MAS = 10.00 (m)	6032.19	6000.00					MinPt-O-SF
	3069.45	33.94	3045.99	3035.51	148.32	OSF1.50	7150.00	7116.49					MinPt-CtCt
	3069.57	34.34	3045.85	3035.23	144.50	OSF1.50	7250.00	7216.49					MINPT-O-EOU
	3069.87	34.68	3045.92	3035.19	142.98	OSF1.50	7330.00	7296.49					MinPt-O-ADP
	3168.53	44.77	3135.85	3121.76	112.28	OSF1.50	9500.00	9465.89					MinPt-O-SF
	3340.89	53.78	3304.01	3286.82	97.65	OSF1.50	10410.00	9850.00					MinPts
	3352.94	58.23	3313.28	3294.72	90.18	OSF1.50	10710.00	9850.00					MinPts
	3354.59	63.08	3311.71	3291.53	83.03	OSF1.50	10890.00	9850.00					MinPt-CtCt
	3333.10	74.83	3282.31	3258.17	68.97	OSF1.50	11430.00	9850.00					MinPt-CtCt
	3333.36	75.73	3282.04	3257.83	68.23	OSF1.50	11480.00	9850.00					MINPT-O-EOU
	3333.75	76.21	3282.11	3257.54	67.79	OSF1.50	11510.00	9850.00					MinPt-O-ADP
	3313.68	104.11	3243.43	3209.58	48.88	OSF1.50	12560.00	9850.00					MinPt-CtCt
	3313.99	104.96	3243.18	3209.04	48.48	OSF1.50	12610.00	9850.00					MINPT-O-EOU
	3314.28	105.29	3243.25	3208.99	48.33	OSF1.50	12630.00	9850.00					MinPt-O-ADP
	3337.93	117.70	3258.63	3220.23	43.43	OSF1.50	13050.00	9850.00					MinPt-CtCt
	3339.00	128.66	3252.39	3210.34	39.87	OSF1.50	13440.00	9850.00					MinPt-CtCt
	3339.94	148.79	3239.91	3191.15	34.22	OSF1.50	14140.00	9850.00					MinPt-CtCt
	3340.49	150.47	3239.34	3190.02	33.84	OSF1.50	14220.00	9850.00					MINPT-O-EOU
	3341.36	151.51	3239.52	3189.85	33.61	OSF1.50	14270.00	9850.00					MinPt-O-ADP
	3344.75	162.09	3235.85	3182.65	31.41	OSF1.50	14600.00	9850.00					MinPt-CtCt
	3338.66	201.97	3203.19	3138.70	25.09	OSF1.50	15960.00	9850.00					MinPt-CtCt
	3331.57	234.64	3174.31	3096.93	21.51	OSF1.50	17060.00	9850.00					MinPt-CtCt
	3332.57	237.65	3173.30	3094.91	21.24	OSF1.50	17190.00	9850.00					MINPT-O-EOU
	3340.50	250.08	3172.94	3090.42	20.22	OSF1.50	17610.00	9850.00					MINPT-O-EOU
	3344.26	255.38	3173.17	3088.88	19.82	OSF1.50	17790.00	9850.00					MINPT-O-EOU
	3331.69	308.32	3125.32	3023.38	16.33	OSF1.50	19520.00	9850.00					MinPt-CtCt
	3331.82	308.75	3125.15	3023.07	16.31	OSF1.50	19550.00	9850.00					MINPT-O-EOU
	3332.05	309.02	3125.20	3023.03	16.29	OSF1.50	19570.00	9850.00					MinPt-O-ADP
	3339.59	311.03	3131.40	3028.58	16.22	OSF1.50	19750.52	9850.00					MinPt-O-SF

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		

Cimarex Vaca Draw 20-17
Federal #5H Final
MWD(Surcon Corrected) (Def Survey)

2558.58	32.81	2558.08	2525.77	N/A	MAS = 10.00 (m)	0.00	0.00	Surface
2558.55	32.81	2556.00	2525.74	54061.14	MAS = 10.00 (m)	26.00	26.00	WRP
2558.59	32.81	2551.90	2523.78	1163.31	MAS = 10.00 (m)	540.00	540.00	MinPts
2558.69	32.81	2551.16	2523.88	843.26	MAS = 10.00 (m)	740.00	740.00	MinPts
2558.93	32.81	2550.78	2524.12	699.54	MAS = 10.00 (m)	870.00	870.00	MINPT-O-EOU
2558.72	32.81	2549.06	2525.91	356.89	MAS = 10.00 (m)	1650.00	1650.00	MinPts
2558.81	32.81	2548.93	2526.00	346.52	MAS = 10.00 (m)	1700.00	1700.00	MINPT-O-EOU
2577.08	32.81	2563.44	2544.27	231.12	MAS = 10.00 (m)	2600.00	2599.98	MinPt-O-SF
2590.59	32.81	2578.93	2557.78	231.86	MAS = 10.00 (m)	2760.00	2759.84	MinPt-O-SF
2603.58	32.81	2589.86	2570.77	231.82	MAS = 10.00 (m)	2860.00	2859.05	MinPt-O-SF
2810.21	32.81	2598.46	2577.40	231.95	MAS = 10.00 (m)	2902.65	2901.33	MinPt-O-SF
3121.98	32.81	3099.33	3089.18	154.80	MAS = 10.00 (m)	6032.19	6000.00	MinPt-O-SF
3169.94	39.95	3142.48	3128.99	126.87	OSF1.50	8380.00	8346.49	MinPt-CICt
3170.30	41.04	3142.11	3129.27	123.30	OSF1.50	8590.00	8558.49	MINPT-O-EOU
3170.79	41.60	3142.22	3129.18	121.53	OSF1.50	8700.00	8666.49	MinPt-O-ADP
3178.03	45.57	3148.82	3132.46	110.60	OSF1.50	9430.00	9396.48	MinPt-O-ADP
3281.87	66.98	3236.39	3214.89	76.29	OSF1.50	11020.00	9850.00	MinPt-CICt
3282.19	67.94	3236.07	3214.25	75.18	OSF1.50	11080.00	9850.00	MINPT-O-EOU
3282.61	68.42	3236.16	3214.19	74.64	OSF1.50	11110.00	9850.00	MinPt-O-ADP
3282.11	87.42	3223.00	3194.69	57.93	OSF1.50	11870.00	9850.00	MinPt-CICt
3282.79	89.75	3222.12	3193.04	56.39	OSF1.50	11980.00	9850.00	MINPT-O-EOU
3283.43	90.52	3222.26	3192.92	55.91	OSF1.50	12020.00	9850.00	MinPt-O-ADP
3281.56	109.03	3208.04	3172.53	46.17	OSF1.50	12680.00	9850.00	MinPt-CICt
3281.37	112.32	3205.66	3169.05	44.78	OSF1.50	12800.00	9850.00	MinPt-CICt
3281.96	114.00	3205.12	3167.96	44.12	OSF1.50	12880.00	9850.00	MINPT-O-EOU
3282.65	114.83	3205.26	3167.82	43.80	OSF1.50	12920.00	9850.00	MinPt-O-ADP
3280.15	155.83	3175.43	3124.32	32.08	OSF1.50	14320.00	9850.00	MinPt-CICt
3281.28	159.13	3174.34	3122.13	31.40	OSF1.50	14460.00	9850.00	MINPT-O-EOU
3281.65	162.16	3172.71	3119.49	30.81	OSF1.50	14540.00	9850.00	MinPt-CICt
3282.49	164.70	3171.85	3117.79	30.33	OSF1.50	14650.00	9850.00	MINPT-O-EOU
3284.27	167.42	3171.82	3116.85	29.85	OSF1.50	14750.00	9850.00	MINPT-O-EOU
3273.64	199.60	3139.74	3074.04	24.89	OSF1.50	15810.00	9850.00	MinPt-CICt
3278.55	214.25	3134.89	3064.30	23.21	OSF1.50	16330.00	9850.00	MINPT-O-EOU
3283.32	222.53	3134.13	3060.78	22.37	OSF1.50	16610.00	9850.00	MINPT-O-EOU
3288.07	227.62	3133.49	3058.45	21.88	OSF1.50	16780.00	9850.00	MINPT-O-EOU
3287.38	231.97	3131.89	3055.40	21.47	OSF1.50	16900.00	9850.00	MinPt-CICt
3288.25	234.51	3131.08	3053.74	21.24	OSF1.50	17010.00	9850.00	MINPT-O-EOU
3278.05	277.41	3092.27	3000.63	17.87	OSF1.50	18420.00	9850.00	MinPt-CICt
3280.87	283.65	3090.94	2997.22	17.49	OSF1.50	18660.00	9850.00	MINPT-O-EOU
3288.84	294.10	3091.94	2994.74	16.90	OSF1.50	19010.00	9850.00	MINPT-O-EOU
3289.04	294.31	3092.00	2994.73	16.89	OSF1.50	19020.00	9850.00	MinPt-O-ADP
3281.05	310.41	3073.28	2970.65	15.97	OSF1.50	19520.00	9850.00	MinPt-CICt
3281.19	310.87	3073.11	2970.32	15.95	OSF1.50	19550.00	9850.00	MINPT-O-EOU
3281.43	311.16	3073.16	2970.27	15.93	OSF1.50	19570.00	9850.00	MinPt-O-ADP
3289.13	313.29	3079.44	2975.84	15.86	OSF1.50	19750.52	9850.00	MinPt-O-SF

Cimarex Vaca Draw 20-17
Federal #1H Surcon 0H-12740
(Def Survey)

2578.56	32.81	2578.05	2545.75	997848.11	MAS = 10.00 (m)	0.00	0.00	Surface
2578.48	32.81	2575.91	2545.67	37781.01	MAS = 10.00 (m)	26.00	26.00	WRP
2576.54	32.81	2572.82	2543.73	2107.44	MAS = 10.00 (m)	300.00	300.00	MinPts

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
2577.01	32.81	2572.44	2544.20	1244.29	MAS = 10.00 (m)	460.00	460.00					MINPT-O-EOU	
2626.44	32.81	2612.82	2593.63	235.90	MAS = 10.00 (m)	2600.00	2599.98					MinPt-O-SF	
2635.91	32.81	2622.27	2603.10	236.42	MAS = 10.00 (m)	2720.00	2719.78					MinPt-O-SF	
2658.51	32.81	2644.77	2625.70	236.32	MAS = 10.00 (m)	2890.00	2888.80					MinPt-O-SF	
3220.13	32.91	3197.36	3187.23	158.73	OSF1.50	6032.19	6000.00					MinPt-O-SF	
3321.55	41.75	3292.88	3279.80	126.84	OSF1.50	8520.00	8488.49					MINPT-O-EOU	
3321.66	41.87	3292.91	3279.79	126.45	OSF1.50	8550.00	8516.49					MinPt-O-ADP	
3326.30	46.46	3294.49	3279.84	113.42	OSF1.50	9460.00	9426.38					MinPt-CtCt	
3326.40	46.93	3294.29	3279.48	112.23	OSF1.50	9560.00	9523.84					MINPT-O-EOU	
3326.52	47.07	3294.31	3279.45	111.88	OSF1.50	9590.00	9551.97					MinPt-O-ADP	
3833.67	62.60	3791.10	3771.07	95.62	OSF1.50	11580.00	9850.00					MinPt-O-SF	
3853.74	62.91	3810.96	3790.83	95.62	OSF1.50	11620.00	9850.00					MinPt-O-SF	
10613.25	81.85	10557.86	10531.41	200.59	OSF1.50	19750.52	9850.00					TD	

Cimarex Vaca Draw 20-17
Federal #1H ST01 Rev1 RM
15Feb18 (Def Plan)

2578.56	32.81	2576.05	2545.75	997648.11	MAS = 10.00 (m)	0.00	0.00					Surface	Pass
2578.48	32.81	2575.91	2545.67	37781.01	MAS = 10.00 (m)	26.00	26.00					WRP	
2576.54	32.81	2572.82	2543.73	2107.44	MAS = 10.00 (m)	300.00	300.00					MinPts	
2577.01	32.81	2572.44	2544.20	1244.29	MAS = 10.00 (m)	460.00	460.00					MINPT-O-EOU	
2626.44	32.81	2612.82	2593.63	235.90	MAS = 10.00 (m)	2600.00	2599.98					MinPt-O-SF	
2635.91	32.81	2622.27	2603.10	236.42	MAS = 10.00 (m)	2720.00	2719.78					MinPt-O-SF	
2658.51	32.81	2644.77	2625.70	236.32	MAS = 10.00 (m)	2890.00	2888.80					MinPt-O-SF	
3220.13	32.91	3197.36	3187.23	158.73	OSF1.50	6032.19	6000.00					MinPt-O-SF	
3321.55	41.75	3292.88	3279.80	126.84	OSF1.50	8520.00	8488.49					MINPT-O-EOU	
3321.66	41.87	3292.91	3279.79	126.45	OSF1.50	8550.00	8516.49					MinPt-O-ADP	
3326.30	46.46	3294.49	3279.84	113.42	OSF1.50	9460.00	9426.38					MinPt-CtCt	
3326.40	46.93	3294.29	3279.48	112.23	OSF1.50	9560.00	9523.84					MINPT-O-EOU	
3326.52	47.07	3294.31	3279.45	111.88	OSF1.50	9590.00	9551.97					MinPt-O-ADP	
3833.67	62.60	3791.10	3771.07	95.62	OSF1.50	11580.00	9850.00					MinPt-O-SF	
3853.74	62.91	3810.96	3790.83	95.62	OSF1.50	11620.00	9850.00					MinPt-O-SF	
4138.66	323.68	3922.04	3814.98	19.32	OSF1.50	19520.00	9850.00					MinPt-CtCt	
4138.85	324.51	3921.78	3814.44	19.27	OSF1.50	19570.00	9850.00					MINPT-O-EOU	
4139.24	324.83	3921.85	3814.41	19.25	OSF1.50	19590.00	9850.00					MinPt-O-ADP	
4145.03	327.12	3926.11	3817.91	19.14	OSF1.50	19750.52	9850.00					MinPt-O-SF	

Cimarex Vaca Draw 20-17
Federal #1H ST01 MWD Off-
Update (Non-Def Survey)

2578.56	32.81	2576.05	2545.75	997648.11	MAS = 10.00 (m)	0.00	0.00					Surface	Pass
2578.48	32.81	2575.91	2545.67	37781.01	MAS = 10.00 (m)	26.00	26.00					WRP	
2576.54	32.81	2572.82	2543.73	2107.44	MAS = 10.00 (m)	300.00	300.00					MinPts	
2577.01	32.81	2572.44	2544.20	1244.29	MAS = 10.00 (m)	460.00	460.00					MINPT-O-EOU	
2626.44	32.81	2612.82	2593.63	235.90	MAS = 10.00 (m)	2600.00	2599.98					MinPt-O-SF	
2635.91	32.81	2622.27	2603.10	236.42	MAS = 10.00 (m)	2720.00	2719.78					MinPt-O-SF	
2658.51	32.81	2644.77	2625.70	236.32	MAS = 10.00 (m)	2890.00	2888.80					MinPt-O-SF	
3220.13	32.91	3197.36	3187.23	158.73	OSF1.50	6032.19	6000.00					MinPt-O-SF	
3321.55	41.75	3292.88	3279.80	126.84	OSF1.50	8520.00	8488.49					MINPT-O-EOU	
3321.66	41.87	3292.91	3279.79	126.45	OSF1.50	8550.00	8516.49					MinPt-O-ADP	
3326.30	46.46	3294.49	3279.84	113.42	OSF1.50	9460.00	9426.38					MinPt-CtCt	
3326.40	46.93	3294.29	3279.48	112.23	OSF1.50	9560.00	9523.84					MINPT-O-EOU	
3326.52	47.07	3294.31	3279.45	111.88	OSF1.50	9590.00	9551.97					MinPt-O-ADP	
3833.67	62.60	3791.10	3771.07	95.62	OSF1.50	11580.00	9850.00					MinPt-O-SF	
3853.74	62.91	3810.96	3790.83	95.62	OSF1.50	11620.00	9850.00					MinPt-O-SF	
4143.40	97.30	4077.70	4048.11	65.52	OSF1.50	12320.00	9850.00					MINPT-O-EOU	

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
4144.10	98.12	4077.85	4045.97	64.97	OSF1.50	12360.00	9850.00					MinPt-O-ADP	
4130.25	134.20	4039.95	3996.05	47.01	OSF1.50	13610.00	9850.00					MinPt-CICl	
4130.93	136.37	4039.19	3994.56	46.26	OSF1.50	13710.00	9850.00					MINPT-O-EQU	
4134.25	140.12	4040.00	3994.13	45.03	OSF1.50	13860.00	9850.00					MinPt-O-ADP	
4136.30	145.87	4038.22	3990.43	43.25	OSF1.50	14040.00	9850.00					MINPT-O-EQU	
4138.40	148.40	4038.64	3990.00	42.52	OSF1.50	14140.00	9850.00					MinPt-O-ADP	
4154.98	185.17	4044.03	3989.81	38.28	OSF1.50	14870.00	9850.00					MinPt-CICl	
4157.03	173.24	4040.70	3983.79	36.50	OSF1.50	14970.00	9850.00					MINPT-O-EQU	
4158.89	175.45	4041.08	3983.44	36.05	OSF1.50	15060.00	9850.00					MinPt-O-ADP	
4137.00	205.94	3998.88	3931.08	30.48	OSF1.50	16050.00	9850.00					MinPt-CICl	
4137.50	207.37	3998.42	3930.13	30.28	OSF1.50	16120.00	9850.00					MINPT-O-EQU	
4137.99	207.97	3998.51	3930.02	30.19	OSF1.50	16150.00	9850.00					MinPt-O-ADP	
4171.89	228.08	4018.99	3943.80	27.72	OSF1.50	16790.00	9850.00					MinPt-CICl	
4172.22	228.98	4018.73	3943.24	27.62	OSF1.50	16840.00	9850.00					MINPT-O-EQU	
4172.52	229.33	4018.80	3943.18	27.58	OSF1.50	16860.00	9850.00					MinPt-O-ADP	
4232.32	237.86	4072.91	3994.46	26.96	OSF1.50	17500.00	9850.00					MinPt-O-SF	
5117.16	234.13	4960.23	4883.02	33.12	OSF1.50	19750.52	9850.00					TD	

1. Geological Formations

TVD of target 9,850
MD at TD 19,751

Pilot Hole TD N/A
Deepest expected fresh water

Formation	Depth (TVD) from KB	Water/Mineral Bearing/Target Zone	Hazards
Rustler	935	N/A	
Top of Salt	1298	N/A	
Base of Salt	4714	N/A	
Lamar	4909	N/A	
Bell Canyon	4937	N/A	
Cherry Canyon	5990	N/A	
Brushy Canyon	7536	Hydrocarbons	
Bone Spring	9032	Hydrocarbons	
1st Bone Spring Sand	10011	Hydrocarbons	
2nd Bone Spring Sand	10583	Hydrocarbons	
3rd Bone Spring Sand	11722	Hydrocarbons	
Wolfcamp	12189	Hydrocarbons	
Wolfcamp	12430	Hydrocarbons	

2. Casing Program

Hole Size	Casing Depth From	Casing Depth To	Setting Depth TVD	Casing Size	Weight (lb/ft)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
17 1/2	0	1051	1051	13-3/8"	48.00	H-40/J-55 Hybrid	ST&C	1.54	3.60	6.38
12 1/4	0	4949	4949	9-5/8"	40.00	J-55	LT&C	1.48	1.50	2.63
8 3/4	0	9406	9406	7"	29.00	L-80	LT&C	1.59	1.85	3.51
8 3/4	9406	19751	9850	5-1/2"	17.00	L-80	BT&C	1.36	1.68	52.60
BLM Minimum Safety Factor								1.125	1	1.6 Dry 1.8 Wet

TVD was used on all calculations.

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Does casing meet API specifications? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	N
Is well within the designated 4 string boundary.	N
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	N
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	N
Is 2nd string set 100' to 600' below the base of salt?	N
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	N
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	N
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	N
Is AC Report included?	N

3. Cementing Program

Casing	# Sks	Wt. lb/gal	Yld ft ³ /sack	H ₂ O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surface	509	13.50	1.72	9.15	15.5	Lead: Class C + Bentonite
	137	14.80	1.34	6.32	9.5	Tail: Class C + LCM
Intermediate	938	12.90	1.88	9.65	12	Lead: 35:65 (Poz:C) + Salt + Bentonite
	289	14.80	1.34	6.32	9.5	Tail: Class C + LCM
Production	240	10.30	3.64	22.18		Lead: Tuned Light + LCM
	1496	14.20	1.30	5.86	14:30	Tail: 50:50 (Poz:H) + Salt + Bentonite + Fluid Loss + Dispersant + SMS

Casing String	TOC	% Excess
Surface	0	45
Intermediate	0	50
Production	4749	25

4. Pressure Control Equipment

A variance is requested for the use of a diverter on the surface casing. See attached for schematic.					
BOP installed and tested before drilling which hole?	Size	Min. Required WP	Type		Tested To
12 1/4	13 5/8	2M	Annular	X	50% of working pressure
			Blind Ram		2M
			Pipe Ram		
			Double Ram	X	
			Other		
8 3/4	13 5/8	3M	Annular	X	50% of working pressure
			Blind Ram		3M
			Pipe Ram		
			Double Ram	X	
			Other		

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

Formation integrity test will be performed per Onshore Order #2. On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i.	
X	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart.
N	Are anchors required by manufacturer?

5. Mud Program

Depth	Type	Weight (ppg)	Viscosity	Water Loss
0' to 1051'	FW Spud Mud	8.30 - 8.80	30-32	N/C
1051' to 4949'	Brine Water	9.70 - 10.20	30-32	N/C
4949' to 19751'	Cut Brine or OBM	8.50 - 9.00	27-70	N/C

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times.

What will be used to monitor the loss or gain of fluid?	PVT/Pason/Visual Monitoring
---	-----------------------------

6. Logging and Testing Procedures

Logging, Coring and Testing	
	Will run GR/CNL from TD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
	No logs are planned based on well control or offset log information.
	Drill stem test?
	Coring?

Additional Logs Planned	Interval
-------------------------	----------

7. Drilling Conditions

Condition	
BH Pressure at deepest TVD	4609 psi
Abnormal Temperature	No

Hydrogen Sulfide (H₂S) monitors will be installed prior to drilling out the surface shoe. If H₂S is detected in concentrations greater than 100 ppm, the operator will comply with the provisions of Onshore Oil and Gas Order #6. If Hydrogen Sulfide is encountered, measured values and formations will be provided to the BLM.

X	H ₂ S is present
X	H ₂ S plan is attached

8. Other Facets of Operation**9. Wellhead**

A multi-bowl wellhead system will be utilized.

After running the 13-3/8" surface casing, a 13 5/8" BOP/BOPE system with a minimum working pressure of 3000 psi will be installed on the wellhead system and will be pressure tested to 250 psi low followed by a 3000 psi test. Annular will be tested to 50% of working pressure. The pressure test will be repeated at least every 30 days, as per Onshore Order No. 2.

The multi-bowl wellhead will be installed by vendor's representative. A copy of the installation instructions has been sent to the BLM field office.

The wellhead will be installed by a third-party welder while being monitored by the wellhead vendor representative.

All BOP equipment will be tested utilizing a conventional test plug. Not a cup or J-packer type.

A solid steel body pack-off will be utilized after running and cementing the intermediate casing and production casing. After installation the pack-off and lower flange will be pressure tested to 3000 psi.

The surface casing string will be tested as per Onshore Order No. 2 to at least 0.22 psi/ft or 1500 psi, whichever is greater.

The casing string utilizing steel body pack-off will be tested to 70% of casing burst.

If well conditions dictate conventional slips will be set and BOPE will be tested to appropriate pressures based on permitted pressure requirements.

PECOS DISTRICT DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	CIMAREX ENERGY COMPANY
LEASE NO.:	NMNM26394
WELL NAME & NO.:	VACA DRAW 20-17 FEDERAL 44H
SURFACE HOLE FOOTAGE:	390' FSL & 2120' FEL
BOTTOM HOLE FOOTAGE:	100' FNL & 1626' FEL
LOCATION:	Section 20, T. 25 S., R 33 E., NMPM
COUNTY:	LEA County, New Mexico

COA

H2S	☐ Yes	☒ No	
Potash	☒ None	☐ Secretary	☐ R-111-P
Cave/Karst Potential	☒ Low	☐ Medium	☐ High
Variance	☐ None	☒ Flex Hose	☐ Other
Wellhead	☐ Conventional	☒ Multibowl	☐ Both
Other	☐ 4 String Area	☐ Capitan Reef	☐ WIPP
Other	☒ Fluid Filled	☐ Cement Squeeze	☐ Pilot Hole
Special Requirements	☐ Water Disposal	☐ COM	☐ Unit

All Previous COAs Still Apply, Except for the Following:

A. CASING

1. The 13-3/8 inch surface casing shall be set at approximately **1040 feet** (a minimum of 25 feet (Lea County) into the Rustler Anhydrite and above the salt) and cemented to the surface.
 - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
 - b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)
 - c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
 - d. If cement falls back, remedial cementing will be done prior to drilling out that string.

Intermediate casing must be kept fluid filled to meet BLM minimum collapse requirement.

2. The minimum required fill of cement behind the 9-5/8 inch intermediate casing is:
 - Cement to surface. If cement does not circulate see B.1.a, c-d above.
3. The minimum required fill of cement behind the 7 X 5 ½ inch production casing is:
 - Cement should tie-back at least **200 feet** into previous casing string. Operator shall provide method of verification.

B. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).'
2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **2000 (2M)** psi.
3. Operator has proposed a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the intermediate casing shoe shall be **3000 (3M)** psi.
 - a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
 - b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
 - c. Manufacturer representative shall install the test plug for the initial BOP test.
 - d. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.
 - e. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.

JJP07032019

GENERAL REQUIREMENTS

The BLM is to be notified in advance for a representative to witness:

- a. Spudding well (minimum of 24 hours)
- b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
- c. BOPE tests (minimum of 4 hours)

☒ Chaves and Roosevelt Counties
Call the Roswell Field Office, 2909 West Second St., Roswell NM 88201.
During office hours call (575) 627-0272.
After office hours call (575)

☒ Eddy County
Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220,
(575) 361-2822

☒ Lea County
Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575)
393-3612

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.
 - a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).
 - b. When the operator proposes to set surface casing with Spudder Rig
 - Notify the BLM when moving in and removing the Spudder Rig.
 - Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
 - BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.
2. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.

3. The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.

A. CASING

1. Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.
2. Wait on cement (WOC) for Potash Areas: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log.
3. Wait on cement (WOC) for Water Basin: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements.
4. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.
5. No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.
6. On that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.
7. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.
2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.
3. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.
4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:
 - a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
 - b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
 - c. Manufacturer representative shall install the test plug for the initial BOP test.
 - d. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
 - e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.
5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
 - a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the

plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

- b. In potash areas, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time.
- c. The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).
- d. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.
- e. The results of the test shall be reported to the appropriate BLM office.
- f. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.
- g. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.
- h. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.